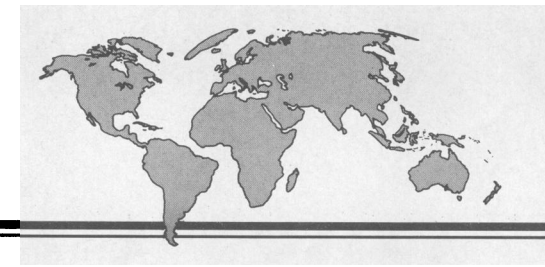
AIDS - A Global Perspective



Global Epidemiology

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A total of 62,811 cases of the acquired immunodeficiency syndrome (AIDS) have been reported to the World Health Organization from throughout the world. Extensive epidemiologic studies have shown that human immunodeficiency virus (HIV) infections are transmitted by three routes: sexual, parenteral and perinatal. Three geographic patterns of transmission have been defined. In pattern I, transmission occurs predominantly among homosexual and bisexual men and urban intravenous drug abusers; transmission via blood products has been controlled; the male:female sex ratio is 10:1 or more; population HIV seroprevalence is low, and perinatal transmission is uncommon (for instance, United States, western Europe). In pattern II, transmission is predominantly heterosexual and perinatal; transmission via blood products exists but is being reduced; unsterile needles and other skin-piercing instruments cause some parenteral transmission (magnitude not known); the male:female sex ratio is 1:1, and population seroprevalence often exceeds 1% (central Africa, Haiti). In pattern III, AIDS cases are just being documented and are generally due to sexual exposure abroad or imported blood products (Middle East, Asia).

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The short and remarkable history of the epidemiology of the acquired immunodeficiency syndrome (AIDS) began in 1981 with the description of the clinical syndrome in California and New York.[1,2] In the six years that have followed, intensive epidemiologic studies have defined the mode of spread of AIDS and laid the foundation for current control efforts. Serosurveys and retrospective clinical studies have been used to trace the temporal origins of the pandemic prior to 1981, while prospective studies and an increasingly comprehensive worldwide surveillance system have provided more accurate data for the years following 1981. AIDS cases have now been reported and investigated throughout the world.

Initially, clinical case definitions of AIDS were the principal tool of epidemiologic investigations, but after the discovery of etiologic retroviruses in 1983 and 1984[3,4] and the subsequent licensing of tests for antibody to human immunodeficiency virus (HIV) in 1985,[5] serologic data became available and increased the sophistication of epidemiologic studies. Because HIV infection in a population precedes the appearance of clinical AIDS by months to years, an optimal understanding of the current epidemiology must be based on an analysis of both HIV serologic data and reported AIDS cases.

This review considers the methods and limitations of AIDS case reporting and HIV serologic studies, summarizes modes of HIV transmission, defines three geographic patterns of spread and then examines by continent the epidemiology of HIV infections.

Background

AIDS Case Definitions and Reporting

The initial clinical case definition of AIDS was published by the Centers for Disease Control (CDC) in 1982[6] and was subsequently adopted by the World Health Organization (WHO).[7] Strict criteria for the diagnosis of AIDS including documented Kaposi's sarcoma, *Pneumocystis carinii* pneumonia or other serious opportunistic infections were delineated. Subsequently the definition underwent minor revisions as other opportunistic infections and malignant tumors were recognized as indicative of AIDS. In 1985 serologic criteria were also added.[8]

In 1987 a broader CDC case definition for AIDS was proposed and adopted. The new definition adds AIDS encephalopathy, the HIV wasting syndrome and the presumptive diagnosis of indicator diseases to the previous definition[9] and is expected to increase the case count in the United States by 10% to 15%.[10]

Since clinical manifestations of AIDS differ in developing and industrialized countries, and since serologic confirmation is not available in many developing countries, WHO developed a clinical case definition at a workshop in Bangui, Central African Republic.[11] The WHO clinical case definition for adults is based on the "slim disease" presentation and includes both major and minor criteria (Table 1).[7]

Studies in Zaire have shown the Bangui definition to have a specificity of 90% for adult HIV infection but a sensitivity of only 59%.[12] False-positives with this definition are often

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ABBREVIATIONS USED IN TEXT

AIDS = acquired immunodeficiency syndrome
CDC = Centers for Disease Control
HIV = human immunodeficiency virus
HTLV-IV = human T-lymphotrophic virus type IV
IV = intravenous
WHO = World Health Organization

due to the presence of tuberculosis because this disease often coexists with AIDS in Africa and has similar symptoms.

The true case count for pediatric AIDS is also underestimated by the surveillance definition,[8] since definitive diagnosis of opportunistic infection and exclusion of other causes of immunodeficiency are difficult in younger age groups. A broader classification system has been published, and a broader surveillance definition proposed.[13]

AIDS case reports to WHO are based on the standard CDC/WHO definition, the WHO Bangui definition and physician diagnosis. Not all countries report AIDS cases to the World Health Organization, and in some reporting countries with limited health care systems, case ascertainment is incomplete. Thus, both underreporting and the limitations of surveillance and clinical definitions contribute to the underestimation of AIDS cases worldwide.

Serologic Studies

Tests for antibody to HIV are the basis for most published HIV serosurveys. HIV antibodies are detectable by enzyme-linked immunosorbent assay one to two months after exposure and persist indefinitely.[14] In interpreting published reports of HIV seroprevalence, certain technical limitations of HIV antibody testing should be recognized. Some early reports of HIV seropositivity in Africa may have been inaccurate because of weak false-positive results due to the presence of malaria antibodies[15] and technical factors related to banked specimens.[16] The identification of additional human retroviruses (HIV-2, for example), some of which cross-react with HIV-1, further complicates interpretation of serologic data. In general, more recent studies and studies that discriminate between HIV-1 and HIV-2 will provide the most accurate data on seroprevalence.

Modes of Transmission

The human immunodeficiency virus has been isolated from blood[4] and serum[17] and from various body fluids, including semen,[18] cervicovaginal fluid,[19] breast milk,[20] tears[21] and saliva.[22] Detailed epidemiologic studies from throughout the world, however, have documented only three basic modes of transmission: sexual, parenteral and perinatal.

Sexual transmission occurs predominantly in homosexual and bisexual men and in heterosexual men and women.[23] Reports of transmission between homosexual women have been rare.[24] Risk factors for homosexual and bisexual transmission include numerous sexual partners, receptive anal intercourse and "fisting."[23,25]

Among heterosexuals transmission is related to the number of sexual partners, to contact with prostitutes[16,23] and, in some industrialized countries, to sexual contact with intravenous (IV) drug abusers.[26] The cumulative risk of HIV transmission to long-term heterosexual partners is about 50%, although the range of risk is wide.[27,28]

The risk of infection from a single heterosexual contact with an HIV-infected person is difficult to quantitate. It is dependent not only on the type of sexual activity but also on the infectivity of the partner. Calculated estimates have all been less than 1%.[29] However, in one study of artificial insemination with the introduction of semen from an infected donor directly into the cervix, four of eight women became infected.[30]

Parenteral transmission occurs with the transfusion of infected blood or blood products and with the use of unsterilized needles and syringes and other skin-penetrating instruments. In studies of single parenteral exposures, the risk of acquiring HIV infection appears related to the volume of inoculum. Recipients of a single unit of HIV-infected blood have an 89% or higher risk of acquiring infection.[31] Hemophiliacs who have received coagulation factor VIII concentrates have seroprevalence rates as high as 74% to 86%[25]; rates are lower among those who have received only cryoprecipitate.[32] Prospective studies of health care workers sustaining needle-stick injuries from AIDS patients have documented a risk of 0.5%.[33]

When needle-stick injuries have resulted in HIV transmission, the volume of blood injected has often been significant. The cumulative risk of HIV infection after multiple parenteral exposures to infected individuals is 51% to 87% among parenteral drug abusers in some high risk areas.[25] The risk of HIV infection from a single needle-sharing exposure is not known. Although the volume of blood inoculated is similar to that for a hospital-acquired needle-stick,[34] the drug abuser injects directly into the vein, a practice likely to create a single exposure risk higher than the 0.5% cited for needle-stick accidents among health care workers.

Perinatal transmission may occur before, during or shortly after birth. Although all three modes have been documented, the relative importance of each has not been defined. The overall risk of HIV transmission from an infected mother to infant ranges from 25% to 50%.[35-37] The human immunodeficiency virus has been isolated from a fetus aborted at 20 weeks[38] and from cord blood at birth.[39] Infection has been documented in infants delivered by cesarean section.[40] Postnatal transmission has been described in infants exposed to

TABLE 1.—*Clinical Case Definition for Adults with the Acquired Immunodeficiency Syndrome**

Requirements	*Major Signs*	*Minor Signs*
Disseminated Kaposi's sarcoma, or	Weight loss ≥10% of body weight	Persistent cough for >1 month
Cryptococcal meningitis or	Chronic diarrhea for >1 month	Generalized pruritic dermatitis
Two or more major signs plus one or more minor signs (in the absence of other causes of immunosuppression such as cancer or severe malnutrition)	Fever for >1 month (intermittent or constant)	Recurrent herpes zoster
		Oropharyngeal candidiasis
		Chronic progressive or/and disseminated herpes simplex
		Generalized lymphadenopathy

*From World Health Organization (Bangui).[7]

mothers who acquired HIV infection after delivery, with breast milk suggested as the possible means.[41]

Geographic Patterns of HIV Infection

Sexual, parenteral and perinatal modes of infection explain HIV transmission around the world, but there are significant geographic differences in both the relative frequencies of the three types of transmission and in the specific ways in which they occur in different cultures. Three major patterns are summarized in Table 2.

In pattern I, AIDS has been recognized since the late 1970s, and general population seroprevalence is low. Homosexual and bisexual intercourse predominate as the most common forms of transmission, with heterosexual transmission at a low level but expected to increase. Parenteral transmission is also significant and is related principally to IV drug abuse in large urban centers. Unsterile needles, other than those used by IV drug abusers, are not implicated in transmission. Transmission due to blood transfusion occurred between the late 1970s and 1985 but has now been controlled through the screening of blood supplies. Because rates of HIV infection among women are low, perinatal transmission is not common. It does occur among infants of female IV drug abusers, female sexual contacts of IV drug abusers and women from HIV-endemic areas. Pattern I has been recognized principally in industrialized nations, including the United States and many countries in western Europe.

In pattern II, HIV infection has been present since the mid-1970s, and transmission occurs among larger risk groups; hence, population seroprevalence is higher—often over 1%. Heterosexual transmission is the major mode of spread, and because of the resulting high seroprevalence rate among women, perinatal transmission is common. Blood transfusions have been a major risk, but HIV screening is now being introduced in many areas. Unsterile needles and syringes used for diagnostic or therapeutic purposes are potential factors in transmission, but the magnitude of this problem is difficult to assess.

In pattern III, HIV infection was introduced in the early to mid-1980s. Homosexual and heterosexual transmission are just now being documented, principally among prostitutes and persons from other known HIV-endemic areas or risk groups or those who have had contact with such groups. Most documented parenteral transmission has occurred among recipients of imported blood and blood products. Indigenous transmission by transfusion is a potential future problem, while transmission via IV drug abuse is not considered to be a major existing or future problem; perinatal transmission has not yet been documented.

Global Epidemiology

A total of 62,811 cases of AIDS have been reported to WHO by 127 countries as of November 1987. Figure 1 shows those countries that have reported one to nine cases and those that have reported ten or more. Table 3 shows that AIDS cases have been reported from every continent of the world. Figure 2 gives the worldwide epidemic curve by six-month reporting intervals. Because 70% of worldwide AIDS cases have been reported from the United States, a separate curve has been added to show cases from all other countries. Both curves are increasing at the same rate. WHO estimates that the actual number of AIDS cases in the world is 100,000 to 150,000 and that the number of HIV-infected persons is in the range of 5 to 10 million.

The Americas

As mentioned previously, AIDS was first described in the United States in 1981,[1,2] and reports suggest that the disease was present in the United States at least by 1978.[42] More than 44,000 cases had been reported by late 1987.[43] Transmission pattern I was first described in the United States, and cases continue to be distributed among risk groups in this pattern (Table 4).

Although reported cases of AIDS continue to double every 12 months, serologic data suggest that new acquisition rates for HIV have plateaued in at least one homosexual population under regular surveillance.[44] Screening of blood products (instituted in March 1985) and heat treatment of blood factor concentrates (beginning in October 1984) are expected to have virtually eliminated the new acquisition of HIV infection in the United States via blood products.[45,46] Because of the long incubation period for AIDS, however, any reduction in HIV transmission will not affect the number of reported AIDS cases for several years.

The largest increase in cases by risk groups from 1985 to 1986 was in the heterosexual contact category—a 131% increase.[26] Most heterosexual contact cases have been reported in women (83%), usually from contact with IV drug abusers and bisexual men (66%).[26] The estimated risk to health care workers had been studied most extensively in the United States and has been found to be extremely low.[47,48] Rare episodes of transmission of HIV have been reported from needle-

TABLE 2.—*Geographic Patterns of Infection With the Human Immunodeficiency Virus (HIV)*

	Pattern I	*Pattern II*	*Pattern III*
Population seroprevalence	Less than 1%	More than 1%	Insignificant
Male:female sex ratio	10:1 or greater	1:1	Undetermined
Sexual transmission	Homosexual/bisexual ++	Heterosexual ++	Heterosexual +
	Heterosexual +		Homosexual +
Parenteral transmission	Urban IV drug abuse ++	Blood, blood products ++	Imported blood +
	Blood, blood products +	Unsterile needles + ?	
Perinatal transmission	Female IV drug abuse ++	Female endemic ++	Not documented
	Female sexual contacts of IV drug abusers ++		
	Females from HIV-endemic areas +		
Examples	North America, Europe, some areas of South America, Australia, New Zealand	Central, eastern and southern Africa, Haiti	Middle East, Asia

IV=intravenous; ++=predominant; +=present; + ? =present, magnitude unknown

sticks[49] and from mucous membrane and other nonparenteral exposure to infected blood.[50]

As of November 1987, AIDS has been reported in 628 children younger than 13 years in the United States.[43] The majority of these cases (77%) are infants of mothers at risk because of IV drug abuse or contact with IV drug abusers.[26] Other means of infection in the pediatric group include transfusion (12%), hemophilia/coagulation disorder (6%) and undetermined (5%).[43]

Brazil has reported the second largest number of cases in the Americas—1,965 by July of 1987. Transmission pattern I has been documented, with homosexual and bisexual men representing 75% of cases, hemophiliacs 5% and IV drug abusers and transfusion recipients 2% each.[51] Seropositivity rates for HIV among blood donors range from 0% in smaller cities to 0.14% in Sao Paulo[52] and 0.12% in Rio de Janeiro.[51] Despite the recognition of seropositive blood as a source of HIV transmission, implementing screening has been difficult with Brazil's largely commercial blood transfusion system.[51]

Although detailed epidemiologic data are not available for other countries in Central and South America, available reports suggest pattern I transmission (L. Mata, "AIDS in Costa Rica," May 1987, unpublished data). Antibodies to HIV have been reported in residents of rural Venezuela[53] and have been associated with acute malarial infection,[54] but since these results may represent nonspecific reactions, they must be confirmed by other investigators.[55]

In the Caribbean, Haiti has reported the largest number of AIDS cases—851 by July 1987. Review of autopsy and biopsy records suggests that the first AIDS cases appeared in Haiti in 1978, at about the same time as the first documented in the United States.[56] The clinical spectrum of cases in Haiti differs from that reported in the United States, with a higher

TABLE 3.—*Summary of Cases of the Acquired Immunodeficiency Syndrome (AIDS) Reported to the World Health Organization (WHO) as of July 15, 1987*

Continent	Number of Cases	Number of Countries or Territories Reporting Cases
Africa	5,857	37
Americas	48,591	41
Asia	208	18
Europe	7,477	27
Oceania	678	4
Total	62,811	127

TABLE 4.—*Cases of the Acquired Immunodeficiency Syndrome (AIDS) in Adults—USA and Europe*

Transmission Group	USA,%*	Europe,%†
Homosexual/bisexual	66	64
IV drug abuser	16	15
Homosexual/IV drug abuser	8	2
Heterosexual	4	4
Hemophilia/coagulation disorder	1	4
Transfusion	2	3
Undetermined/other	3	8

IV=intravenous

*CDC, AIDS Weekly Surveillance Report, July 6, 1987.
†WHO Collaborating Centre on AIDS, Report No. 13, March 31, 1987.

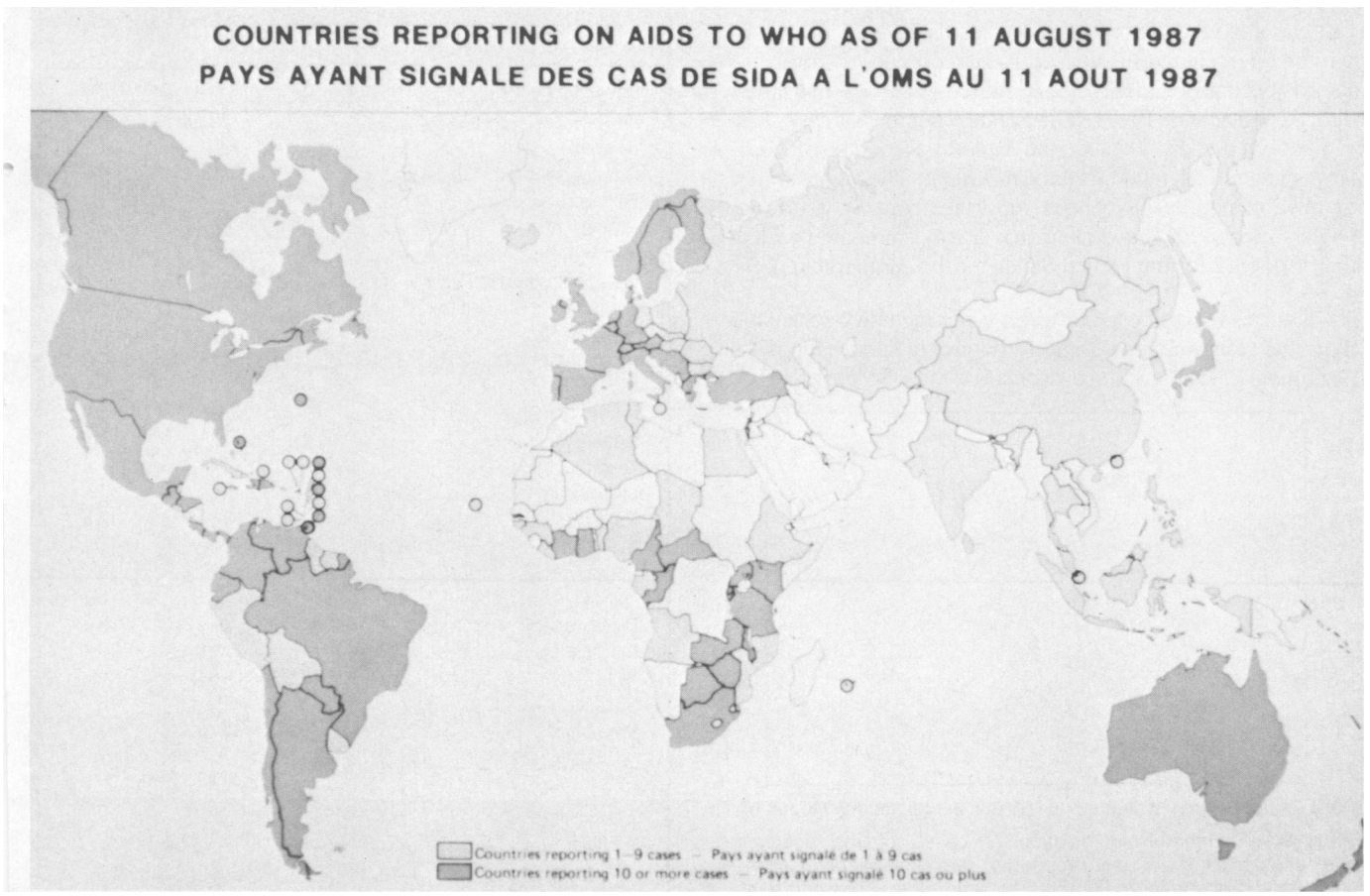

Figure 1.—The map shows countries reporting on the acquired immunodeficiency syndrome to the World Health Organization as of August 1987.

frequency of infections due to *Candida*, cryptosporidia and tuberculosis, and a lower frequency of *P carinii* pneumonia and infections due to atypical mycobacteria.[56] Epidemiologic studies have documented a pattern II transmission.[56-58] AIDS cases differ from controls in having a higher number of heterosexual contacts and more frequent histories of intramuscular injections; the reported male-to-female sex ratio is 3.3:1. Bisexuality is recognized as a risk factor among some men in Haiti,[56] and although it has been suggested that this often reflects male prostitution with tourists, there are no reliable medical data on male prostitution in Haiti.[59] Population seroprevalence is 6% to 8% among adults in urban areas,[60,61] and maternal infant transmission has been documented (N.A. Halsey, unpublished data, August 1987).

AIDS has also been reported from the neighboring Dominican Republic. In this country, with a higher per capita income and different cultural traditions than Haiti, initial reports suggest a type I pattern of transmission. Homosexual men predominate among reported AIDS cases, and seroprevalence studies show the highest rates among Dominican male homosexual prostitutes.[58] Male homosexual prostitution with tourists has been reported.[59]

Europe

In Europe 5,687 cases of AIDS had been reported by April 1987 to WHO by 27 participating countries (Table 5).[62] The pattern of transmission is type I, with minor deviations attributable to cases among non-Europeans. Among adults, the country of origin has been European for 91% of cases, an increase from 85% of total European cases reported in 1986.[62] Other geographic origins for adults include African (5%), Caribbean (2%) and others (2%). In Belgium 53% of adult cases have occurred in nonresidents, mostly from Africa. The percentage of African patients reported from Europe has been decreasing (13% in March 1985, 7% in March 1986, 5% in March 1987). The greatest number of cases has been reported from France, the Federal Republic of Germany, the United Kingdom, Italy and Spain. The highest rates per million people have been reported from Switzerland (34.9), France (29.7) and Denmark (29.4), compared with a figure of 140.2 for the United States for the comparable period.[62]

Countries reporting ten or fewer cases include Czechoslovakia, the German Democratic Republic, Iceland, Hungary, Luxembourg, Malta, Poland, Romania, the USSR and Yugoslavia. Between March 1986 and March 1987 the number of cases increased 123% among the 25 countries reporting for both intervals. The overall male:female sex ratio is 9:1, and the peak incidence is in the 30 to 39 year age range.

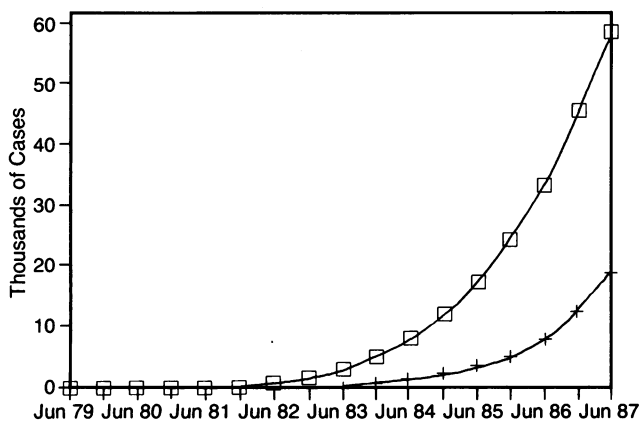

Figure 2.—Six-monthly cumulation of cases of the acquired immunodeficiency syndrome (reported to the World Health Organization as of September 9, 1987). □ = world total; + = world total, excluding the United States

Among adult Europeans the overall distribution of transmission groups is very similar to that of the United States (see Table 4), but there are significant differences by country. Homosexual and bisexual men form the largest group: 64% overall. However, in Denmark (87%), Sweden (85%) and the United Kingdom (89%), more than 80% of cases are in this risk group. The next largest category is heterosexual IV drug abusers, who represent a rapidly growing risk group in Europe[62] and account for 59% of cases in Italy and 52% in Spain. This group is younger (peak age, 20 to 29) and has a higher percentage of women than other risk groups with AIDS (male-to-female sex ratio 3:1).

The rates of HIV seropositivity among urban IV drug abusers vary within countries. In Italy, for example, rates are higher in Rome, Naples and Verona than in Milan and Cagliari.[63] In Scotland seroprevalence rates for this group are more than 50% in Edinburgh compared with 4.5% in Glasgow.[64,65]

Half of the reported heterosexual cases in Europe have occurred in patients from Africa and the Caribbean (106 of 236). High rates of seropositivity have been reported in European prostitutes. Studies in Germany have shown lower rates of seropositivity among registered prostitutes (1%) than among unregistered prostitutes (20% to 50%), many of whom are drug abusers.[66]

TABLE 5.—*Total Number of Cases of the Acquired Immunodeficiency Syndrome Reported in 27 European Countries and Estimated Prevalence Rates per Million Population, March 31, 1987*

Country	Cases	Rate/M*
Austria	72	9.6
Belgium	230	23.2
Czechoslovakia	7†	0.5
Denmark	150	29.4
Finland	19	3.9
France	1.632	29.7
German Democratic Republic	3	0.2
Germany, Federal Republic	999	16.4
Greece	41	4.1
Hungary	3	0.3
Iceland	4	20.0
Ireland	19	5.3
Israel	38	9.0
Italy	664	11.6
Luxembourg	7	17.5
Malta	5	12.5
Netherlands	260	17.9
Norway	45	10.7
Poland	2	0.1
Portugal	54	5.2
Romania	2	0.1
Spain	375	9.3
Sweden	105	12.7
Switzerland	227	34.9
United Kingdom	729	12.9
USSR	3	0.0
Yugoslavia	10	0.4
Total	5,687	

*From AIDS Surveillance in Europe.[62]
†Slovak R.S. 2, Czech S.R. 5.

The percentage of pediatric cases (age 15 or younger) is higher in Europe (3%) than in the United States (1%). This is due exclusively to an increased number of infected children between ages 2 and 5.

Africa

HIV infection was first suspected to be present in Africa when black Africans living in Belgium and France were diagnosed with AIDS in 1983.[67-69] Later that year AIDS was confirmed in patients from Zaire[70] and Rwanda[71] who had never traveled outside their countries. Serologic studies have shown the virus present in Africa in 1959.[72] Patients described in the early African reports differed in several respects from patients described in the United States. The African patients' most prominent symptoms were diarrhea, weight loss and a generalized pruritic maculopapular rash known as "prurigo." This presentation is similar to malnutrition, and is known locally as "slim disease."[73] Among African AIDS patients tuberculosis and cryptococcosis are more common and *P carinii* pneumonia less common than among AIDS patients in the United States. Atypical Kaposi's sarcoma occurs in AIDS patients in both Africa and the United States.[74]

The epidemiologic features of the African cases were also different from those described in the United States. Approximately half the cases were in women. Reported patients had no history of blood transfusion, homosexual activity or intravenous drug abuse.[16] Several cases were linked by heterosexual contact,[70] and a history of exposure to prostitutes was common.[16]

The sex ratio of cases in Africa is approximately 1:1.[16,75] Seroepidemiologic studies of healthy populations in Kinshasa show a bimodal age-specific curve with a first peak among infants (1% to 2% positive) and a second peak among adolescents and young adults (8%). The mean age of AIDS cases in Kinshasa is 34.[75]

In Zaire more male cases (50%) than control subjects (14%) have a history of sexually transmitted disease.[70] In Zaire, Rwanda and Zambia, patients are frequently from the middle or upper classes.[70,71,76] Additional case control studies have shown that AIDS patients have a significantly higher mean number of heterosexual partners than controls (32 versus 3) and that more male patients than controls have a history of sex with prostitutes (81% versus 34%).[16] These features, together with the absence of other identified risk factors, indicate that heterosexual transmission is the major form of HIV transmission in Africa.

Sequential serosurveys have defined a possible pattern of heterosexual spread of HIV in Africa. In traditional rural village areas, such as the Equator region of Zaire, the virus was present in 0.8% of inhabitants by 1976, and seroprevalence rates in 1986 remained stable at 0.8% (N. Nzilambi, K.M. De Cock, D.M. Forthal, et al, "Stability of the Prevalence of Infection With Human Immunodeficiency Virus Over 10 Years in Rural Zaire," submitted for publication, 1987). In urban areas, on the other hand, seroprevalence rates have risen as much as 1% per year[77] to levels of 6% to 9%.[67,75] Studies in African cities have shown that initial seropositive results are often documented in female prostitutes, especially those reporting contact with men from other HIV-endemic areas. After rates rise in prostitutes, seropositivity begins to increase among men who are patients in clinics for sexually transmitted diseases and subsequently appears in pregnant women attending prenatal clinics.[16,78-80]

As a consequence of heterosexual transmission and the prevelance of AIDS and other forms of HIV infection in women, perinatal transmission also plays a significant role in Africa. In a prospective study in Zaire, 5.6% of 2,400 mothers were HIV positive, and 45.9% of their infants had HIV immunoglobulin M antibodies. Women at a more advanced stage of HIV infection with lower T4 lymphocyte counts are more likely to deliver infected infants.[81]

Because of the high seroprevalence of HIV infection in some African countries and the fact that donor HIV screening is either nonexistent or has only been instituted recently, AIDS cases due to blood transfusions continue to be a problem. Studies in Zaire have shown a significant difference in a history of transfusion between seropositive and seronegative hospital workers: 9.3% versus 4.8%.[82] The high rate of HIV seropositivity among African children with sickle cell disease has been related to their total number of transfusions.[83]

Contaminated needles and syringes have been implicated in the spread of other blood-borne viral diseases in Africa,[84] and preliminary evidence suggests they play a role in the spread of HIV infection, as well. Because most AIDS patients have additional risk factors, the contribution of unsterile injections to disease spread is difficult to quantitate.

In a study of the postnatal acquisition of HIV infection in Kinshasa, seropositive children born to seronegative mothers had received a greater mean lifetime number of medical injections (immunizations not included) than control children (44 versus 23).[85] Nonmedical parenteral transmission from other skin-piercing procedures (ritual scarification, circumcision and others) may also play a role.[75,86]

Other retroviruses have recently been isolated from patients in Africa but at present appear to account for only a small number of AIDS cases. In West Africa, AIDS has been caused by a virus known as HIV-2.[87] Healthy HIV-2-seropositive persons have also been identified, and this virus is more prevalent than HIV-1 in West Africa. These HIV-2-seropositive persons fit an epidemiologic pattern suggesting sexual transmission.[87] A closely related virus known as human T-lympotropic virus type IV (HTLV-IV) has also been detected in West Africa.[88,89] Because HTLV-IV infection has been present since the mid 1970s in Senegal, however, and is not associated with immunologic abnormalities in prostitutes or increased seroprevalence among patients with tuberculosis or patients on infectious disease wards, its pathogenicity may be less than that of HIV strains.[88] A preliminary report has linked ten AIDS cases in Nigeria with another new retrovirus.[90]

Surveillance data reported to the World Health Organization indicate the present extent and growth of the epidemic in Africa. Reported AIDS cases have increased dramatically over the past two six-month intervals (986 to 2,073), but a major portion of this increase is due to improved surveillance. In all, 42 African countries report AIDS cases to WHO; 31 of these countries have reported a total of 4,585 cases (July 1987). The greatest number of cases has been reported from central, eastern and parts of southern Africa, with 12 countries reporting more than 100 cases each: Burundi, Central African Republic, the Congo, the Cote d'Ivoire, Ghana, Kenya, Rwanda, Tanzania, Uganda, Zaire, Zambia and Zimbabwe.

Oceania

As of July 1987, a total of 569 cases have been reported from Oceania; 523 of these are from Australia. The first case was reported from Australia in December 1982, and subsequent studies have shown a type I pattern of transmission.[91] The cumulative rate of 23.8 AIDS cases per million places Australia in the range of many western European nations but below that of the United States. Most cases have been reported from Sydney in New South Wales, with 83% of cases in homosexual or bisexual men and with a male-to-female sex ratio of 26:1.

Unlike other areas with a type I pattern of transmission, only 2% of cases occur in homosexual IV drug abusers and less than 1% in heterosexual IV drug abusers.[91] This may be due to the fact that needle sharing occurs only in small groups.[92] Only 1% of cases have been reported to be due to heterosexual contact.[91] Of the remaining cases from Oceania, 45 have been reported from New Zealand, which has an epidemiologic pattern similar to that of Australia.[93]

Other Countries

Transmission pattern III has been observed in other countries reporting small numbers of cases. Among 23 cases studied in Israel, 11 of 12 homosexual men were thought to have acquired infection abroad, and 8 hemophilia patients received imported commercial clotting factors.[94]

The first six cases of AIDS in Thailand were reported in homosexual or bisexual men, and 1985 seroprevalence studies showed rates of 0.8% to 2.4% among homosexual men and 0% among 2,880 female prostitutes and 309 heterosexual men.[95] Ten cases have been reported from the Philippines.

Only two AIDS cases have been reported from China, but seroprevalence has been reported to be 22% among hemophiliacs treated with factor VIII concentrates produced in the United States.[96] Japan has reported 43 AIDS cases, 40 in men and three in women. The male cases include 26 hemophiliacs (who received imported factor VIII and IX concentrates from the United States), 12 homosexuals (3 foreigners) and 2 others. Only one of the three women was Japanese, a prostitute from the Kobe area in the western part of Japan (H. Tamashiro, Y. Kawaguchi, M. Ito: "AIDS Prevention and Control in Japan," pp 719-722 in this issue).[97]

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